



Introduction to HIV

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Disclaimer

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Outline

- Background and Epidemiology
- Acute HIV Infection
- HIV-2
- Diagnostics
- Post-exposure prophylaxis (PEP)

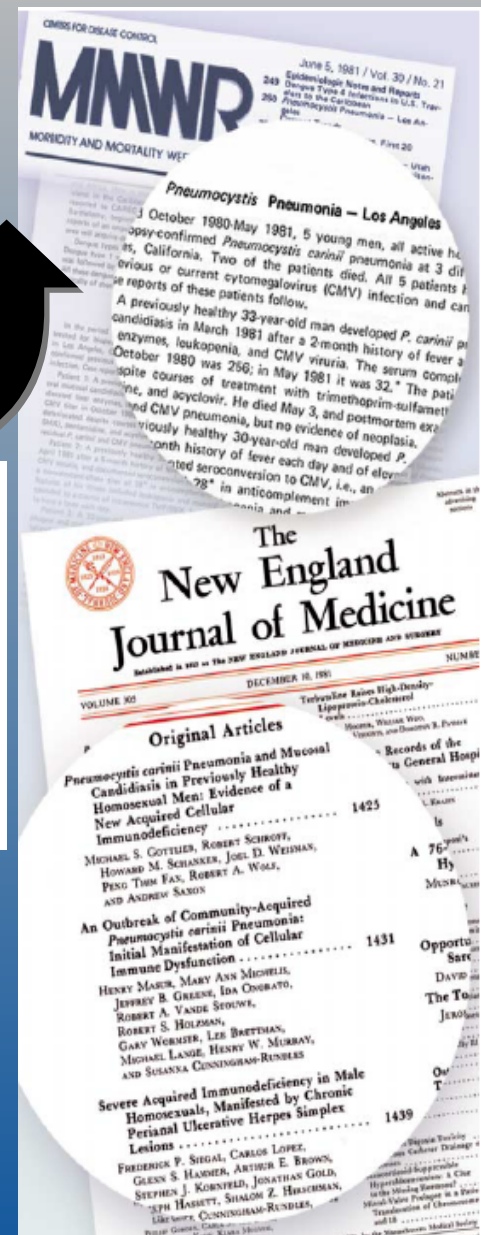
Background

1981 June 5;30:250-2

Pneumocystis Pneumonia — Los Angeles

In the period October 1980-May 1981, 5 young men, all active homosexuals, were treated for biopsy-confirmed *Pneumocystis carinii* pneumonia at 3 different hospitals in Los Angeles, California. Two of the patients died. All 5 patients had laboratory-confirmed previous or current cytomegalovirus (CMV) infection and candidal mucosal infection. Case reports of these patients follow.

June 5, 1981: 5 cases of PCP
in homosexual men from
UCLA (MMWR)

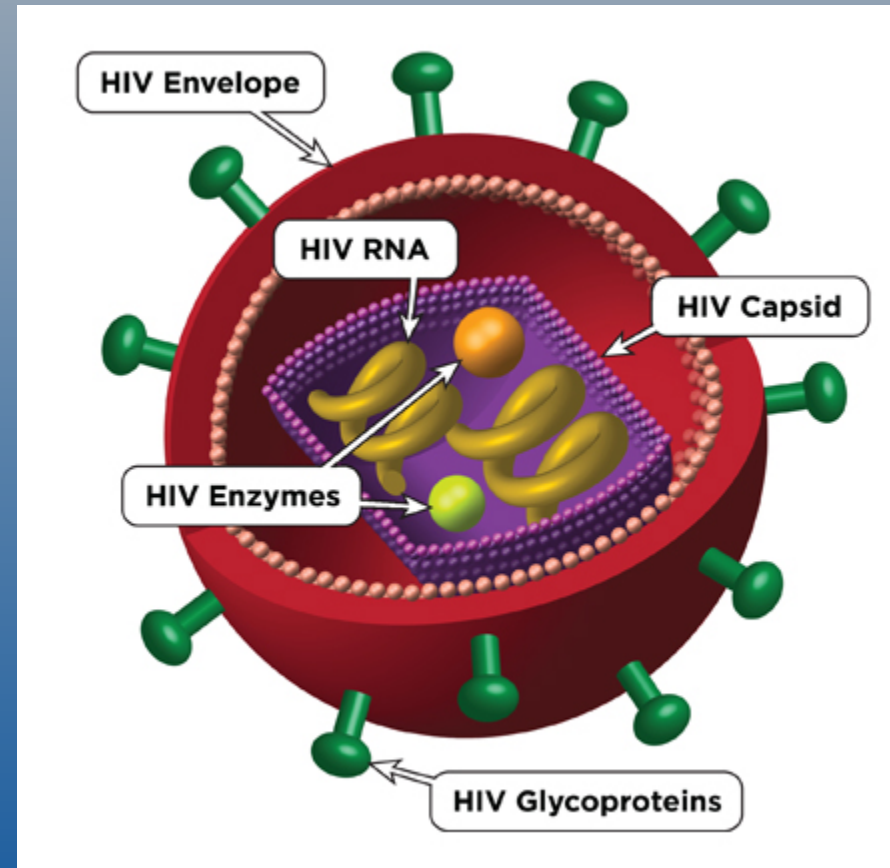


Background

- 1982:
 - Term “AIDS” coined
 - First cases in women reported
 - First transfusion and vertically transmitted cases reported
- 1983:
 - Isolation of a retrovirus from a patient with AIDS

Background

- Origin of HIV
 - Not completely understood
 - Phylogenetic studies suggest that HIV evolved from a lentivirus, simian immunodeficiency virus (SIV)
- HIV mainly targets CD4+ T lymphocytes



Global summary of the AIDS epidemic 2012

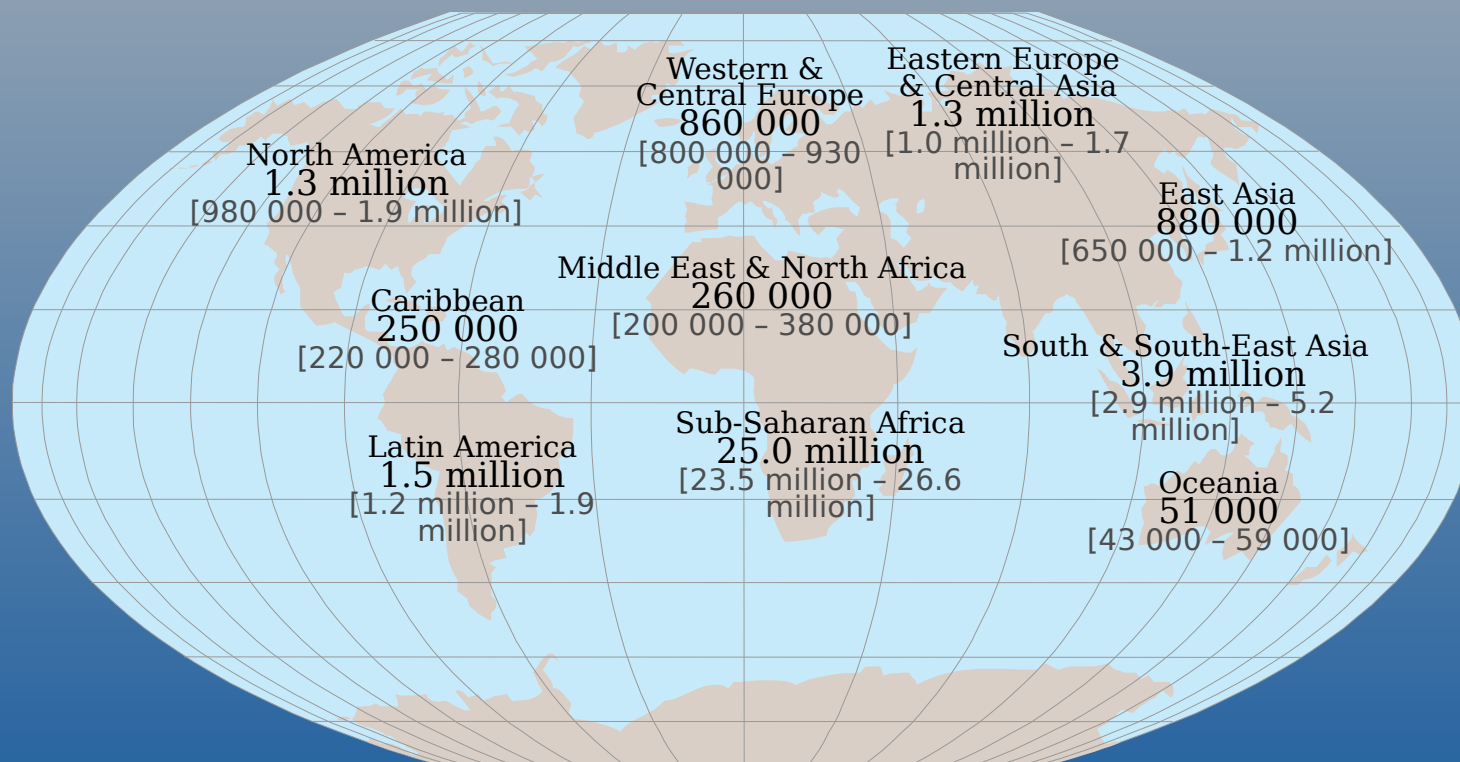
Number of people living with HIV	Total	35.3 million [32.2 million – 38.8 million]
	Adults	38.8 million
	Women	32.1 million [29.1 million – 35.3 million]
	Children (<15 years)	17.7 million [16.4 million – 19.3 million]
People newly infected with HIV in 2012	Total	3.3 million [3.0 million – 3.7 million]
	Adults	
	Children (<15 years)	
AIDS deaths in 2012	Total	2.3 million [1.9 million – 2.7 million]
	Adults	2.0 million [1.7 million – 2.4 million]
	Children (<15 years)	
	Total	
	Adults	260 000 [230 000 – 320 000]
	Children (<15 years)	

Regional HIV and AIDS statistics and features 2012

	Adults and children living with HIV	Adults and children newly infected with HIV	Adult prevalence (15–49) [%]	Adult & child deaths due to AIDS
Sub-Saharan Africa	25.0 million [23.5 million – 26.6 million]	1.6 million [1.4 million – 1.8 million]	4.7% [4.4% – 5.0%]	1.2 million [1.1 million – 1.3 million]
Middle East and North Africa	260 000 [200 000 – 380 000]	32 000 [22 000 – 47 000]	0.1% [0.1% – 0.2%]	17 000 [12 000 – 26 000]
South and South-East Asia	3.9 million [2.9 million – 5.2 million]	270 000 [160 000 – 440 000]	0.3% [0.2% – 0.4%]	220 000 [150 000 – 310 000]
East Asia	880 000 [650 000 – 1.2 million]	81 000 [34 000 – 160 000]	<0.1% [<0.1% – 0.1%]	41 000 [25 000 – 64 000]
Latin America	1.5 million [1.2 million – 1.9 million]	86 000 [57 000 – 150 000]	0.4% [0.3% – 0.5%]	52 000 [35 000 – 75 000]
Caribbean	250 000 [220 000 – 280 000]	12 000 [9400 – 14 000]	1.0% [0.9% – 1.1%]	11 000 [9400 – 14 000]
Eastern Europe and Central Asia	1.3 million [1.0 million – 1.7 million]	130 000 [89 000 – 190 000]	0.7% [0.6% – 1.0%]	91 000 [66 000 – 120 000]
Western and Central Europe	860 000 [800 000 – 930 000]	29 000 [25 000 – 35 000]	0.2% [0.2% – 0.2%]	7600 [6900 – 8300]
North America	1.3 million [980 000 – 1.9 million]	48 000 [15 000 – 100 000]	0.5% [0.4% – 0.8%]	20 000 [16 000 – 27 000]
Oceania	51 000 [43 000 – 59 000]	2100 [1500 – 2700]	0.2% [0.2% – 0.3%]	1200 [<1000 – 1800]
TOTAL	35.3 million [32.2 million – 38.8 million]	2.3 million [1.9 million – 2.7 million]	0.8% [0.7% – 0.9%]	1.6 million [1.4 million – 1.9 million]

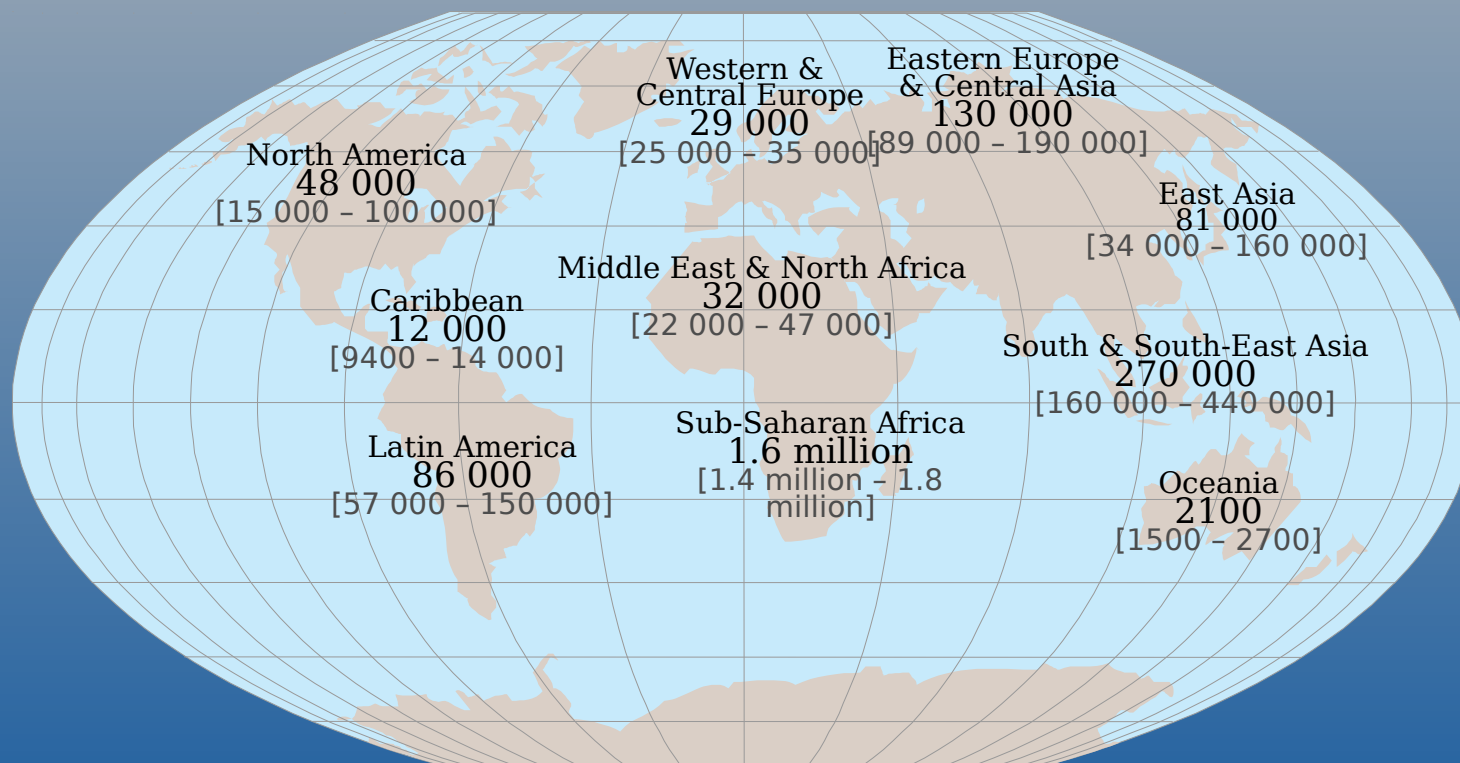
The ranges around the estimates in this table define the boundaries within which the actual numbers lie, based on the best available information.

Adults and children estimated to be living with HIV 2012



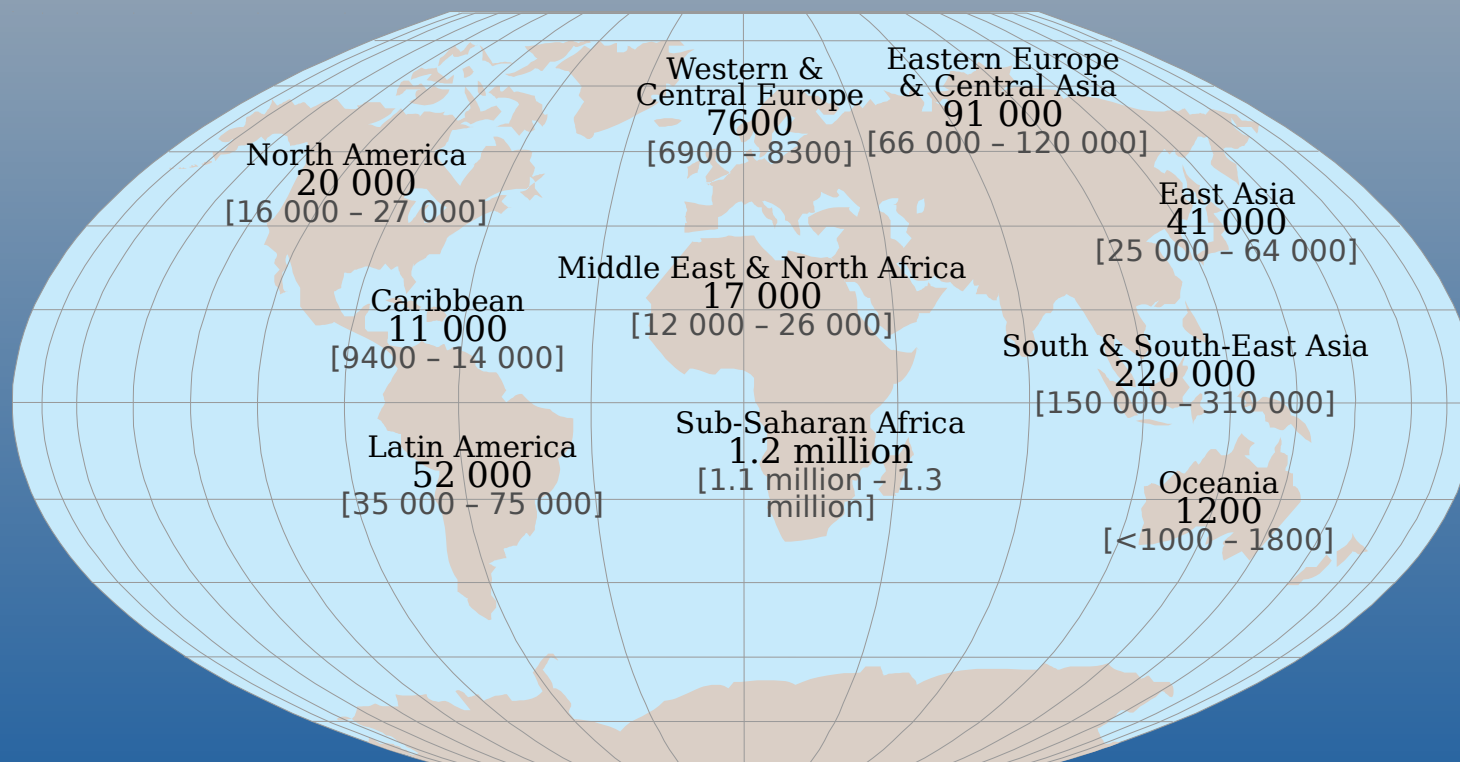
Total: 35.3 million [32.2 million - 38.8 million]

Estimated number of adults and children newly infected with HIV 📄 2012



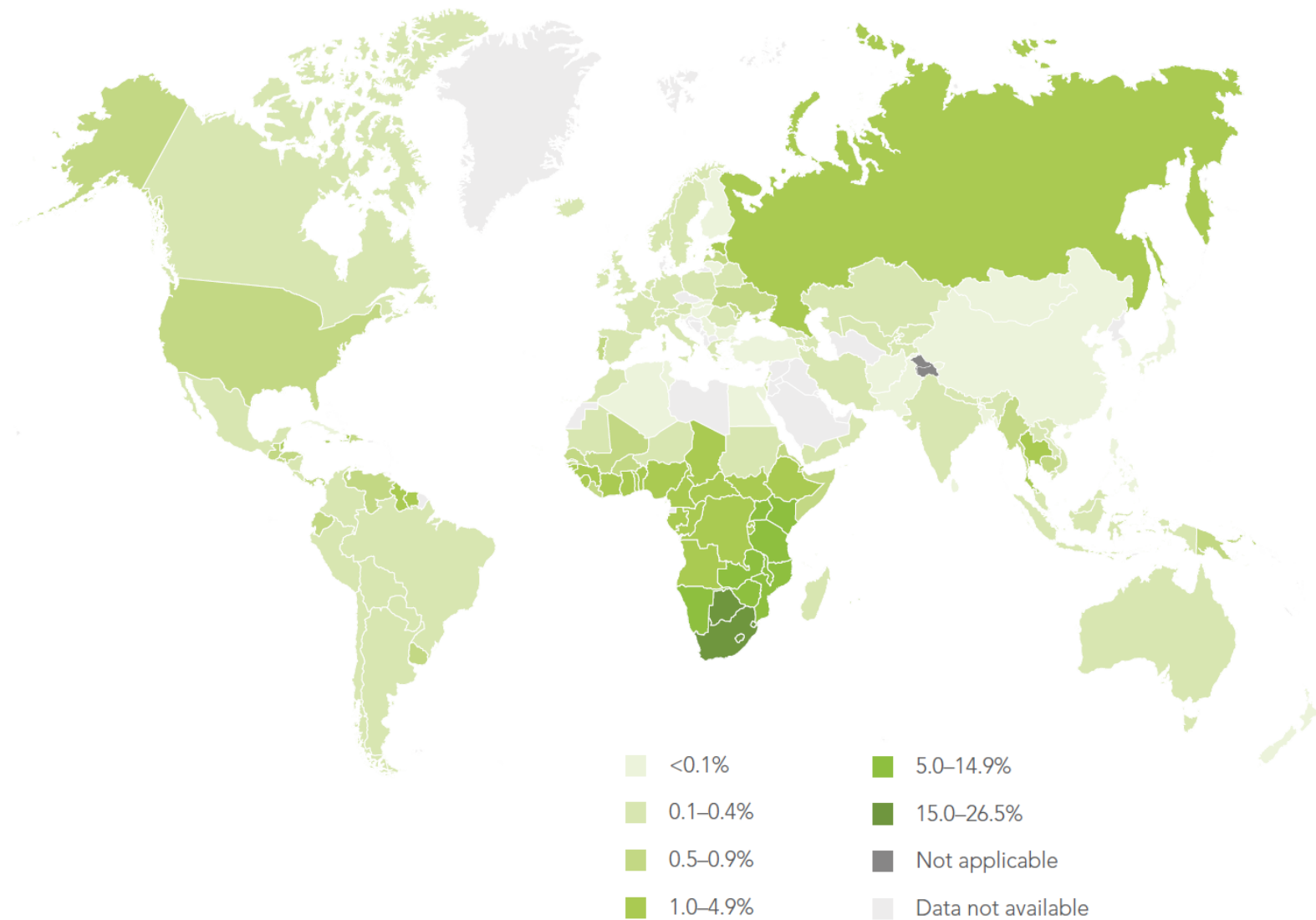
Total: 2.3 million [1.9 million - 2.7 million]

Estimated adult and child deaths from AIDS 📄 2012



Total: 1.6 million [1.4 million - 1.9 million]

HIV prevalence among adults (15-49) % 2012



Transmission

- Sexual contact (co-existing STI ↑ risk)
- Blood and body fluid exposures
- IV drug use
- Mother to child
 - In utero
 - Delivery
 - Breast feeding

Transmission

Estimated per-act risk for acquisition of HIV, by exposure route*

Exposure route	Risk per 10,000 exposures to an infected source
Blood transfusion	9,000
Needle-sharing injection-drug use	67
Receptive anal intercourse	50
Percutaneous needle stick	30
Receptive penile-vaginal intercourse	10
Insertive anal intercourse	6.5
Insertive penile-vaginal intercourse	5
Receptive oral intercourse	1
Insertive oral intercourse	0.5

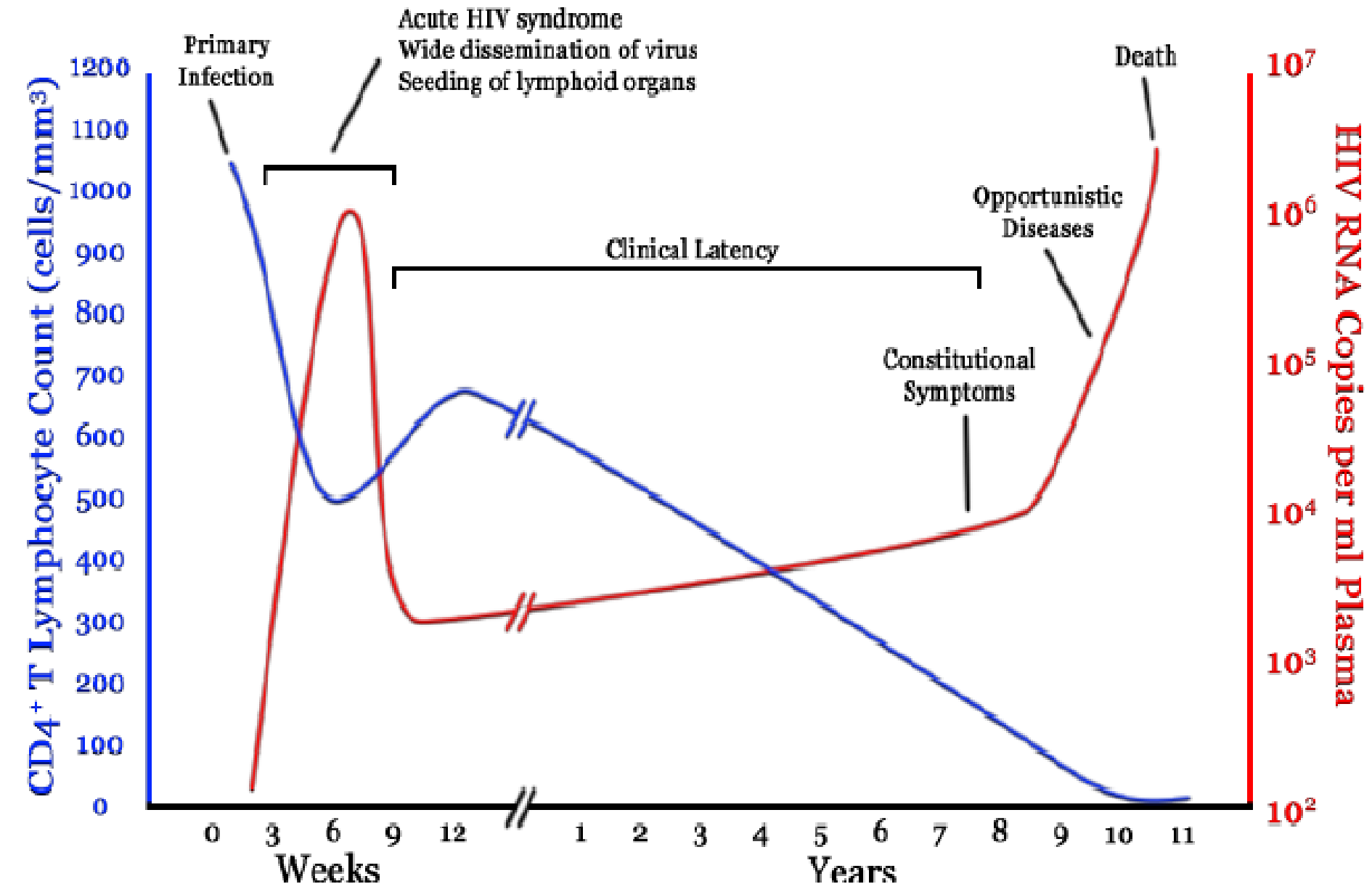


Performed on a male

UpToDate

Risk of perinatal HIV transmission 15-45% (without ART)

Natural History of HIV Infection

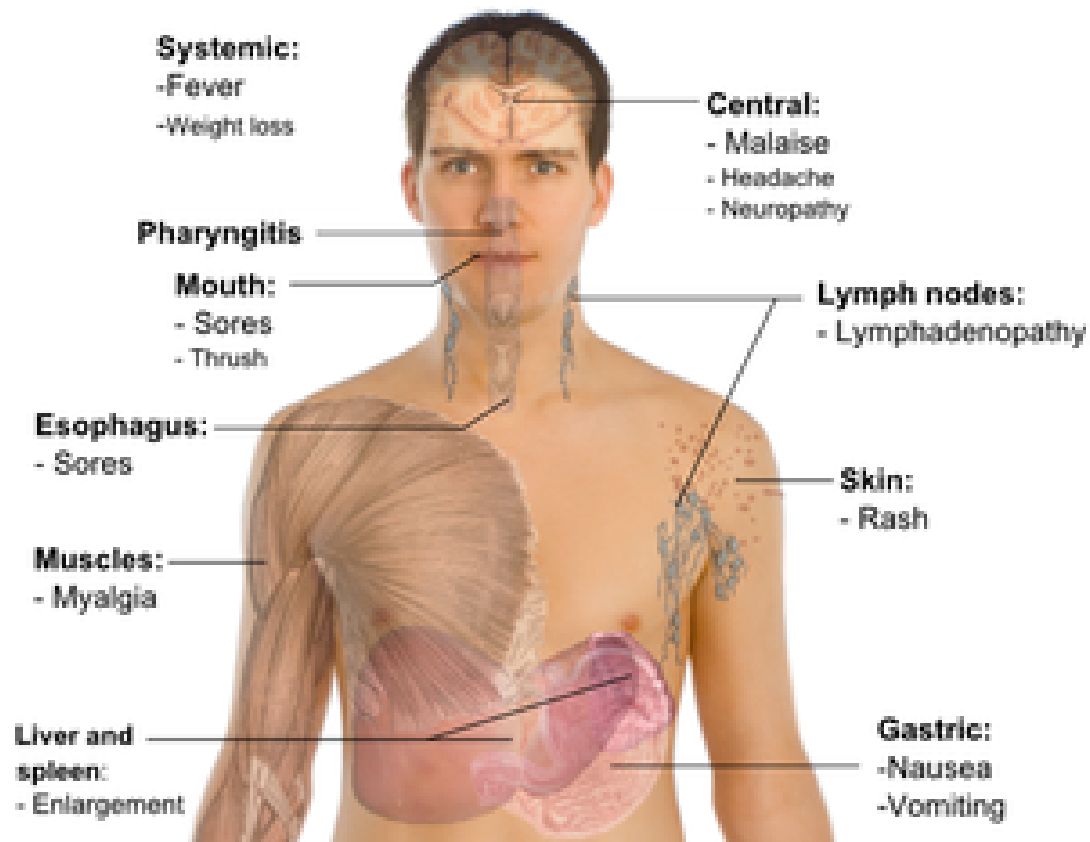


Acute HIV

- Typically occurs 2-12 weeks after infection
- Symptoms can be nonspecific, and last for several weeks (usually at least 7-10 days)
- Many are asymptomatic
- High risk for transmitting HIV to others
 - Very high viral load
 - Unaware of disease
- Diagnosis:
 - High index of suspicion + HIV RNA (viral load)
 - Viral load usually in the 100,000+ range
 - Antibody testing generally not useful as seroconversion may not have occurred yet (window period)

Acute HIV

Main symptoms of Acute HIV infection



Acute HIV

Table A-1. Signs and Symptoms of Acute HIV Infection

Symptom	Frequency (%)
Fever	90
Morbilliform rash	40-80
Pharyngitis	50-70
Lymphadenopathy	40-70
Headache ± meningitis	24-70
Mucocutaneous ulcers	5-20
Thrombocytopenia	45
Leukopenia	40
Transaminase elevations	20

Table A-2. Comparison Between Acute HIV Infection and EBV Mononucleosis

Acute HIV Infection	EBV Mononucleosis
Exudative pharyngitis rare	Exudative pharyngitis common
Painful mucocutaneous ulcers	No ulcers
Morbilliform rash common	Rash uncommon unless ampicillin administered
Vomiting and/or diarrhea	GI symptoms rare
Few atypical lymphocytes	Abundant atypical lymphocytes
Monospot negative	Monospot positive

HIV-2

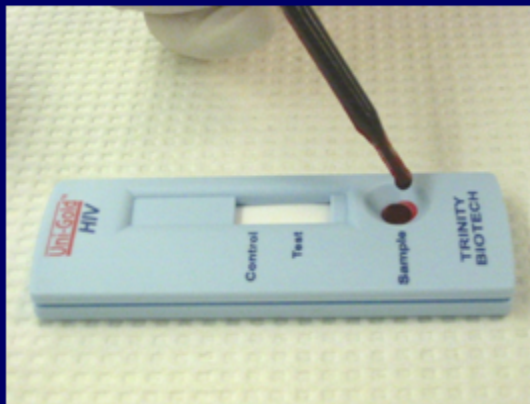
- Serologic evidence in 1985 in Senegal
- Isolated in 1986 from a Cape Verdean patient
- Originally transmitted from West African Sooty mangabeys to humans
- Endemic in West Africa
- Less pathogenic than HIV-1
 - Longer asymptomatic stage of infection
 - Slower decline CD4 count
 - Lower levels of plasma viremia in chronically-infected patients

HIV-2

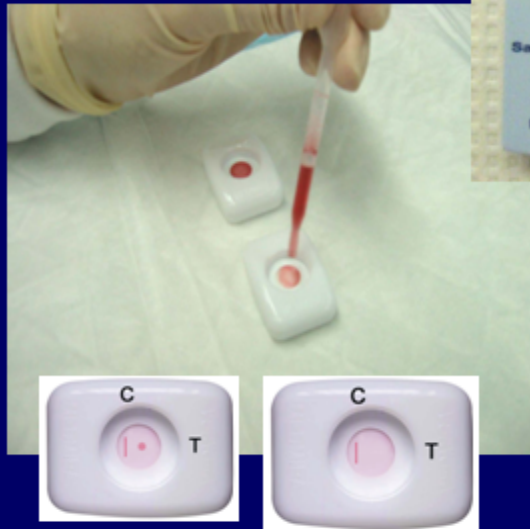
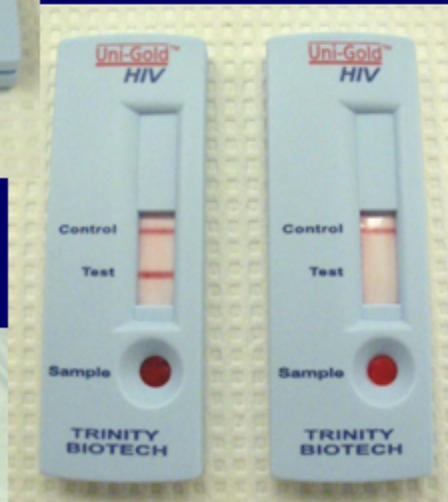
- Diagnosis
 - Most EIA (screening) test for HIV-1 and HIV-2
 - Confirmatory western blot testing may be indeterminate
 - gag (p55, p24, or p17) plus pol (p66, p51, or p32) bands
 - **NO** env (gp160, gp120, or gp41) bands
 - HIV-2 specific western blots and viral load assays are available
 - Contact WRAIR - MHRP (Dr. Sheila Peel's lab)
- Treatment can differ from HIV-1 due to intrinsic resistance to some ART drugs

Diagnostics

- Antibody testing:
 - HIV 1-2 ELISA with confirmatory Western blot
 - Rapid HIV testing (confirmatory testing required)
 - OraQuick (tests saliva sample) – 20 mins
 - Uni-Gold Recombingen – 10-12 mins
- p24 antigen testing
- HIV RNA



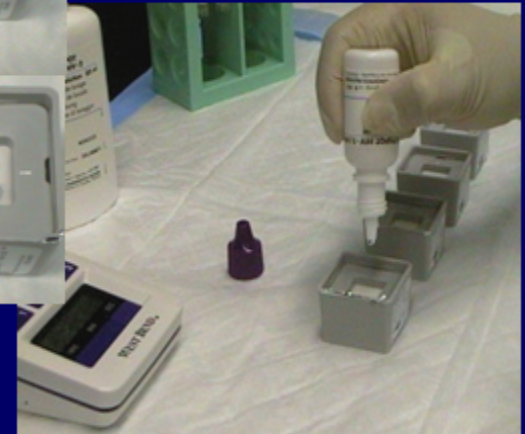
**Uni-Gold
Recombigen**



**Reveal
G2**



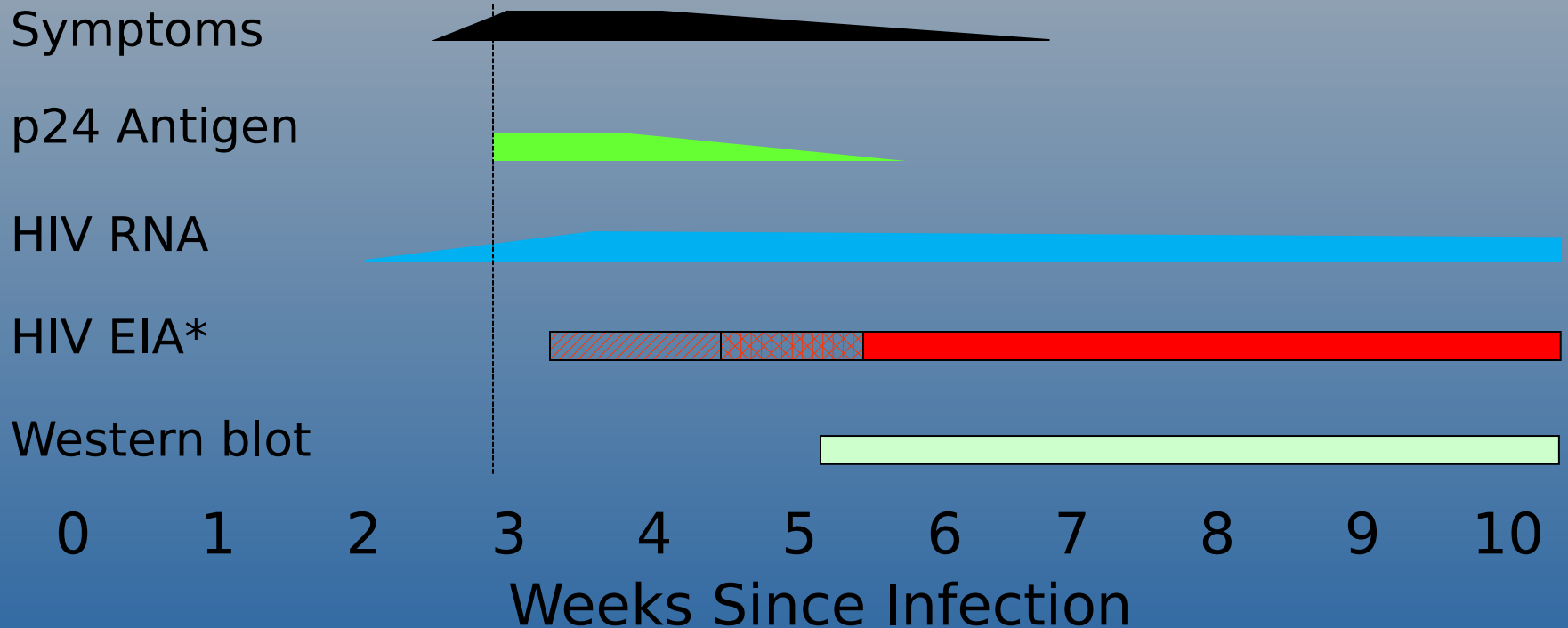
**Multispot
HIV-1/HIV-2**



**OraQuick
Advance**



Detection of HIV by Diagnostic Tests



 *3rd generation, IgM-sensitive EIA

 *2nd generation EIA

 *viral lysate EIA

Fiebig et al, AIDS
2003;17(13):1871-9

4th generation combines EIA with p24 antigen detection

HIV PEP

- Resource:

Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposure to Human Immunodeficiency Virus and Recommendations for Post-Exposure Prophylaxis. Infection Control and Hospital Epidemiology 2013;34 (9): 875-892.

USASOC HIV PEP Protocol Nov 2013

a. Oraquick® is the only FDA approved test that rapidly detects antibodies to HIV-1/2 in saliva. The test is highly accurate with an estimated sensitivity of 99.9% (rare false negative results) and a specificity of 100% (very rare false positive results). Due to its ease of use and accuracy, Oraquick® is the recommended test for rapid HIV exposure testing.

b. DoD uses the Western blot (blood test) as the "gold standard" for the diagnosis of HIV infection. Service members or exposure sources with a positive Oraquick® will be "presumed" positive until confirmatory testing is completed.

Occupational Risk Exposures

- Percutaneous injury (needlestick, cut)

OR

- Contact of mucous membrane or nonintact skin

WITH:

- Blood
- Tissue
- Other body fluids that are potentially infectious (cerebrospinal, synovial, pleural, pericardial, peritoneal, or amniotic fluids; semen or vaginal secretions)

NOT Considered Infectious for HIV Unless *Visibly Bloody*

- Feces
- Nasal Secretions
- Saliva
- Sputum
- Sweat
- Tears
- Urine
- Vomitus

Approximate Risk of Occupational Transmission of HIV

- Following percutaneous exposure: 0.3%
- Following mucous membrane exposure: 0.09%
- Risk following nonintact skin exposure: <0.09%
- Risk following exposure to fluids or tissues other than HIV-infected blood estimated to be “considerably lower” than for blood exposure

Factors Associated with ↑ Risk

- Visible contamination of device (such as needle) with patient's blood
- Needle having been placed directly into vein or artery
- Hollow-bore (vs solid) needle
- Deep injury
- Source patient with terminal illness
- High viral load*

* Risk of transmission via occupational exposure to a source patient with undetectable viral load is thought to be very low but not impossible; PEP should be offered.

PEP labs

- Exposed patient
 - HBV surface antibody (HBsAb)
 - HBV surface antigen (HBsAg)
 - HCV antibody
 - HIV antibody (EIA/ELISA)
 - (AST/ALT, RPR)
- Source patient
 - Rapid HIV
 - HBsAg
 - HCV antibody
 - HIV antibody
 - (RPR)

PEP

- Preferred PEP regimen:
 - Raltegravir 400 mg BID + TDF/FTC (Truvada) 1 pill daily
- PEP should be taken for 28 days
- Consult with ID, especially for:
 - Pregnant or lactating
 - Delayed exposure report (ie, >72 hours)
 - Unknown source
 - Known or suspected ART resistance in source patient
 - Toxicity of the initial PEP regimen
 - Co-morbid conditions in the exposed person
 - Possible HIV-2 exposure

PEP

- Follow-up testing
 - HIV testing at baseline, 6 weeks, 12 weeks, and 6 months after exposure
 - If 4th-generation p24 Ag/HIV Ab test is used: HIV testing at baseline, 6 weeks, 12 weeks, and 4 months after exposure

AFRICOM MOD1 Nov 2013

4. ADDITIONAL GUIDANCE.

a. If using a rapid HIV test kit, it should be FDA approved for detection of both HIV 1 and 2. Recommend against using a negative rapid test as justification for not initiating or stopping HIV PEP in light of the rapid test's three (3) month window period and the relatively high prevalence of HIV on the continent.

b. PEP regimens should not include non-nucleoside reverse transcriptase inhibitors (e.g. efavirenz, etravirine, rilpivirine, nevirapine) since HIV 2 is resistant to this class of antiretrovirals.

c. Contact the AFRICOM infectious disease physician listed below if there are any questions regarding individual patient risk assessment, interpretation of test results and guidance on initiation and discontinuation of HIV PEP. If the AFRICOM infectious disease physician is unavailable, assistance may be requested via the Army Knowledge Online infectious disease teleconsultation service at id.consult@us.army.mil.

Further resources

- Managing exposure to hepatitis B and C
 - Hep B (MMWR 20 Dec 2013; Vol 62, No. 10)
 - Hep C (MMWR 2001;50(RR-11); online at <http://www.cdc.gov/mmwr/PDF/rr/rr5011.pdf>)
- Non-occupational HIV exposure
 - July 2013 NYHD guidelines (www.hivguidelines.org)
- AKO ID consult: id.consult@us.army.mil
- National HIV/AIDS Clinicians' Postexposure Prophylaxis Hotline (PEPline)
 - 24-hour telephone consultation service: 888-448-4911

ART costs (DoD) 30 day supply

- -Atripla: \$1055.55
- -Complera: \$1122.93
- -Stribild: \$1753.44
- -FTC/TDF/ATV/rit: \$1336.34
- -FTC/TDF/DRV/rit: \$1317.10
- -FTC/TDF/Raltegravir: \$1335.76
- -FTC/TDF/Dolutegravir: \$1583.56

QUESTIONS??

AIDS Orphans in Kenya

